


# Montana Pulses

Pulses are high in carbohydrates, protein, calcium, iron, and potassium. They taste great and are a comfort food that's good for you. Due to the high nutrient density, pulses can be considered both as a protein and a vegetable.



# Nutritional Analysis of Montana Pulses

Average value of 15 samples


10 % Moisture Basis	<u>Yellow Peas</u>	<u>Green Peas</u>	<u>Lentils</u>	<u>Chickpeas</u>
<u>Protein</u>	<u>24%</u>	<u>22.90%</u>	<u>24%</u>	<u>22.70%</u>
<u>Fat (acid hydrolysis)</u>	<u>0.90%</u>	<u>0.90%</u>	<u>1.10%</u>	<u>3.10%</u>
<u>Ash</u>	<u>2.10%</u>	<u>2.30%</u>	<u>2.00%</u>	<u>2.40%</u>
<u>Carbohydrates</u>	<u>63.50%</u>	<u>63.20%</u>	<u>63%</u>	<u>63.50%</u>
<u>Calories</u>	<u>358</u>	<u>350</u>	<u>357</u>	<u>373</u>
<u>Calcium</u>	<u>923 ppm</u>	<u>925 ppm</u>		
<u>Potassium</u>	<u>7495 ppm</u>	<u>7490 ppm</u>	ppm = parts per million, ppm = mg/kg	
<u>Iron</u>	<u>47 ppm</u>	<u>46.8 ppm</u>		

For individual variety results: <http://agr.mt.gov/agr/Programs/Commodities/PulseCrops/>



Detailed Method Description(s)
<b>Vacuum moisture</b> Analyses follows MWL FO 002 which references individual AOAC methods for specific materials including beef powders (AOAC 990.19), sugar (AOAC 925.45), flour (AOAC 925.09), pasta (AOAC 926.07), nuts (AOAC 925.40), and others. Samples are weighed in a tin and placed in a special oven that can be sealed, a vacuum produced and temperature regulated. Depending on the material, the amount of sample, vacuum level, temperature, and heating time are followed. After the specified time the samples are re-weighed and the loss in mass is reported as vacuum moisture.
<b>AOAC 992.15 protein</b> Protein analysis is carried out using MWL FO 014 which is based on AOAC 992.15 and USDA/FSIS CLG-PRO04.03. Samples are weighed and placed in an instrument that combusts the sample and releases nitrogen. The amount of nitrogen is determined and then multiplied by a factor to convert the nitrogen value to a protein value. The standard reporting level is 0.1%.
<b>Fat (acid hydrolysis)</b> Analysis follows MWL FO 08 which is based on AOAC 922.06. The homogenized sample is treated with hydrochloric acid and then washed at least twice with both petroleum ether and diethyl ether and the solution placed in a pre-weighed container. The ether solution, which contains the dissolved fat, is evaporated and the percent fat determined by the weight gain of the beaker.
<b>Ash in foods</b> Analysis follows MWL FO 022 which references individual AOAC methods for specific materials including meats (900.02, 920.155, 920.153), confectionaries (AOAC 900.02), spices (AOAC 941.12), pastas (AOAC 925.11), and others. The sample is weighed and ashed at the specified temperature (usually 550 degrees C), cooled in a desiccator and re-weighed. The remaining residue is reported as ash.
<b>Calculation</b> Analytical results are entered into applicable formulas to provide a calculated result which is reported.

Pulses are excellent sources of amino acids, the building blocks of protein and energy that is supplied by carbohydrates. The Feed industry in many parts of the world has recognized the benefits of feeding pulses to animals.



# Nutrient Composition of Montana Pulses

## Finished Feeds Analysis

Average value of 50 samples

10 % moisture basis	<u>Yellow Peas</u>		<u>Green Peas</u>		<u>Lentils</u>		<u>Chickpeas</u>
<u>Dry Matter %</u>	<u>89.20%</u>		<u>89.00%</u>		<u>89.00%</u>		<u>90.30%</u>
<u>Crude Protein</u>	<u>24.40%</u>		<u>23.50%</u>		<u>25.80%</u>		<u>23%</u>
<u>Crude Fat</u>	<u>1.20%</u>		<u>1.35%</u>		<u>0.60%</u>		<u>5.40%</u>
<u>Fiber</u>	<u>7.50%</u>		<u>8.20%</u>		<u>7.45%</u>		<u>3.60%</u>
<u>Ash</u>	<u>2.80%</u>		<u>2.75%</u>		<u>2.35%</u>		<u>3.10%</u>

For individual variety results: <http://agr.mt.gov/agr/Programs/Commodities/PulseCrops/>



### Detailed Method Description(s)

#### Moisture

Analysis follows MWL FD 016 which is based on AOAC 930.15. A sample is blended, mixed, or ground to obtain a homogenous sub-sample. The sample aliquot is placed in a pre-weighed tin, weighed to get a sample weight and then placed in a 135°C convection oven for two (2) hours. The sample is then removed, cooled in a desiccator and reweighed. The loss in weight is reported as % moisture

#### Calculation

Analytical results are entered into applicable formulas to provide a calculated result which is reported.

#### Protein (Crude)

Analysis follows MWL FD 070 which is based on AOAC 990.03. The sample is placed in a combustion instrument and the amount of nitrogen is obtained. The nitrogen value is multiplied by a factor of 6.25 and that value reported as crude protein.

#### Crude Fat

Analysis follows MWL FD 026 which is based on AOAC 945.16. The sample is extracted with drip immersion of the sample in petroleum (pet) ether. The pet ether is poured into a pre-weighed container and then evaporated. The container is re-weighed and the increase in weight is reported as crude fat

#### Acid Detergent Fiber


Analysis follows MWL FD 021 which is based on Ankom Technology method. The sample is sealed in a small bag and the bag immersed in a solution that dissolves certain materials. The bag is washed and dried and re-weighed. The material remaining in the bag is reported as acid detergent fiber

#### Ash

Analysis follows MWL FD 019 which is based on AOAC 942.05. The sample is weighed and placed in a muffle furnace at 600°C. After a period of time, the sample is removed and the remaining material weighed and reported as ash. Moisture and organic material is driven off.

## Energy

**Total Digestible Nutrients (TDN):** The sum of the digestible fiber, protein, lipid, and carbohydrate components of a feedstuff or diet. TDN is directly related to digestible energy and is often calculated based on ADF. TDN is useful for beef cow rations that are primarily forage. When moderate to high concentrations of concentrate are fed, net energy (NE, see below) should be used to formulate diets and predict animal performance. TDN values tend to under predict the feeding value of concentrate relative to forage.



# Available Energy Levels for Pulses

## Feed Analysis

10 % moisture basis	<u>Yellow peas</u>		<u>Green Peas</u>		<u>Lentils</u>		<u>Chickpeas</u>
<u>Total Digestible Nutrients</u>	<u>82.20%</u>		<u>82%</u>		<u>81.50%</u>		<u>88%</u>
<u>Net Energy (lactation)</u>	<u>.86 Mcal/lbs</u>		<u>.865 Mcal/lbs</u>		<u>.85 Mcal/lbs</u>		<u>.92 Mcal/lbs</u>
<u>Net Energy ( maint.)</u>	<u>.87 Mcal/lbs</u>		<u>.90 Mcal/lbs</u>		<u>.86 Mcal/lbs</u>		<u>.98 Mcal/lbs</u>
<u>Net Energy (gain)</u>	<u>.60 Mcal/lbs</u>		<u>.60 Mcal/lbs</u>		<u>.59 Mcal/lbs</u>		<u>.64 Mcal/lbs</u>
<u>Digestable Energy</u>	<u>1.64 Mcal/lbs</u>		<u>1.63 Mcal/lbs</u>		<u>1.64 Mcal/lbs</u>		<u>1.77 Mcal/lbs</u>
<u>Metabolizable Energy</u>	<u>1.50 Mcal/lbs</u>		<u>1.51 Mcal/lbs</u>		<u>1.49 Mcal/lbs</u>		<u>1.60 Mcal/lbs</u>

# United States Nutritional Labels

## Yellow Peas, Raw

### Nutrition Facts

Serving Size 35 g

Amount	% Daily Value
Calories 126	
Total Fat 0.6 g	1 %
Saturated Fat 0 g	1 %
Trans Fat 0 g	
Cholesterol 0 mg	
Sodium 3 mg	0 %
Total Carbohydrate 24 g	8 %
Dietary Fibre 7 g	29 %
Sugars 1 g	
Proteins 7 g	13 %
Vitamin A	0 %
Vitamin C	3 %
Calcium	2 %
Iron	7 %

## Green Peas, Raw

### Nutrition Facts

Serving Size 35 g

Amount	% Daily Value
Calories 126	
Total Fat 0.5 g	1 %
Saturated Fat 0 g	1 %
Trans Fat 0 g	
Cholesterol 0 mg	
Sodium 3 mg	0 %
Total Carbohydrate 24 g	8 %
Dietary Fibre 9 g	36 %
Sugars 1 g	
Proteins 6 g	13 %
Vitamin A	2 %
Vitamin C	3 %
Calcium	2 %
Iron	7 %

## Large Green Lentils, Raw

### Nutrition Facts

Serving Size 35 g

Amount	% Daily Value
Calories 126	
Total Fat 0.5 g	1 %
Saturated Fat 0 g	1 %
Trans Fat	
Cholesterol 0 mg	
Sodium 4 mg	0 %
Total Carbohydrate 22 g	7 %
Dietary Fibre 6 g	25 %
Sugars 1 g	
Proteins 9 g	18 %
Vitamin A	%
Vitamin C	3 %
Calcium	2 %
Iron	12 %